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Professor of Surgery, University of California
San Diego Medical Center

WRITTEN STATEMENT

ON

MEDICAL DEVICES: INNOVATION AND PROVIDER/PATIENT PERSPECTIVES

SUBCOMMITTEE ON HEALTH AND ENVIRONMENT

HOUSE COMMITTEE ON COMMERCE

APRIL 30, 1997

DEVELOPMENT OF A BIOSYNTHETIC TEMPORARY WOUND COVERING FOR BURN PATIENTS

John F. Hansbrough M.D., Professor of Surgery
University of California, San Diego Medical Center

The care of victims of severe burn injury has seen major advances in the past several decades. Among the most important advances has been the use of human skin, harvested from cadavers, for temporarily covering the wounds of burn victims. Cadaver skin has saved the lives of thousands of burn victims by temporarily protecting their wounds while the patients gain strength and are prepared for grafting with their own skin.

Unfortunately, the use of cadaver skin is associated with numerous problems. Among these problems are 1) its relative scarcity; 2) complex steps involved in preparing and transporting the skin; 3) ultimate rejection of the foreign skin by the burn patient's immune system. However, the most important problem with cadaver skin is its potential of transferring infection to the patient. Even though the donor of the skin is highly screened for bacteria and viruses, viral transfer is possible and has occurred, including hepatitis and the AIDS virus. The potential of viral transfer can never be completely prevented, since some donors may be in the early stages of the infection so that screening blood tests are negative.

For these reasons we have developed and now have had approved by the Food and Drug Administration, a bioengineered replacement for human cadaver skin. This material was developed in my laboratories at the University of California, San Diego and at laboratories at Advanced Tissue Sciences, Inc., La Jolla, CA. The

material, called Dermagraft-TC, is composed of human skin fibroblasts which are cultured in the laboratory on a synthetic matrix. Fibroblasts are a very important cell in the skin and in many other tissues. As the fibroblast cells grow in culture in the laboratory, they secrete human proteins and human growth factors. Dermagraft-TC thus resembles in many ways, normal skin. The very top layer of the skin, the epidermis, is mimicked by a thin top layer of silicone in the Dermagraft-TC; this prevents the skin from drying out and prevents bacteria from entering the tissues. The material can be prepared in huge quantities, since human fibroblasts grow very rapidly in culture. The material is very safe, since bacterial and sensitive viral assays are performed on multiple occasions during months of quarantine of the biosynthetic tissue. Very importantly, Dermagraft-TC is not rejected, since human fibroblasts are unique in that they are nonantigenic and therefore are not recognized as foreign cells by the patient who has received the tissue. Therefore, Dermagraft-TC can persist for several months on patients. In contrast, cadaver skin is rejected within a few weeks of placement on wounds.

Dermagraft-TC was approved for human use in March, 1997, by the FDA, following testing at a dozen burn centers. Advanced Tissue Sciences, Inc., is already shipping this life-saving material to burn centers in the United States. Dermagraft-TC can be used on patients with third degree burns, as well as on patients with second degree burns. I will show a brief video which demonstrates the use of Dermagraft-TC on two patients at our Burn Center at the University of California, San Diego Medical Center.

April 25, 1997

Michael Bilirakis
c/o Alan Hill, Legislative Clerk
Chairman, Subcommittee on Health and Environment
U.S. House of Representatives Committee on Commerce
Room 2125, Rayburn Office Building
Washington, D.C. 20515-6115

Dear Mr. Bilirakis:

Enclosed/attached is a one page summary of statements which I plan to make on Wednesday April 30 at the Commerce Committee hearing. My subject will be Dermagraft-TC, the temporary skin replacement for burns on which I have been working for several years and whicn was approved by the FDA last month. I also have a videotape which shows the Dermagraft-TC used on two patients at our Burn Center. The video is 4 minutes. I can limit my verbal comments, if you would like, to one minute, to meet the total 5 minute time allottlement for my presentation. I will Federal Express the VHS video this morning, so you will receive it Monday morning.

For the record, I have received no federal grants in the past three years. I represent solely my own clinical experience at the University of California, San Diego.

My Curriculum Vitae is attached.

Sincerely,

John F. Hansbrough, M.D.
Professor of Surgery
Director, U.C.S.D. Regional Burn Center

CURRICULUM VITAE
JOHN F. HANSBROUGH M. D.

Current Position: Professor of Surgery
Director, Regional Burn Center
Director, Regional Tissue Bank
University of California, San Diego Medical Center

Birth: September 4, 1945; Front Royal, Virginia

Family: Wendy Hansbrough, Assistant Nursing Supervisor, Burn Center, and Educator in Burn Care
Two Children: John Jr. (7 yrs) and Elizabeth (5 yrs)

Education:

College: University of Wisconsin
Madison, Wisconsin 1963-67
B.S. with Honors; Major: Chemistry; Minor: Mathematics

Medical School: Harvard Medical School
Boston, Massachusetts 1967-1972
M.D., Magna Cum Laude, 1972

Fellowship: Department of Bacteriology and Immunology
Harvard Medical School, June 1969 - July 1970
M.D. Thesis: Isolation and Purification of Mammalian RNA and Ribosomes From Lymphoid Tissues

Internship: Surgery, 1972 - 73
University of Colorado Medical Center, Denver, Colorado

Residency: Surgery, 1973 - 1977
University of Colorado Medical Center, Denver, Colorado
Chief Resident, 1976 - 1977

Professional Positions

Aug 1 1984 - Present	Director, Regional Burn Center University of California, San Diego Medical Center
July 1 1990 - Present	Professor of Surgery University of California, San Diego Medical Center
August 1 1984 - June 30 1990	Associate Professor of Surgery University of California, San Diego Medical Center

July 1977 - July 1984	**Assistant Professor through Associate Professor of Surgery** **Univ. of Colorado Health Sciences Center, Denver, Colorado**
1977 - 1984	**Director, Surgical Intensive Care Unit** **University of Colorado Health Sciences Center**
1979 - 1984	**Director, Emergency Department, Regional Burn Center** **University of Colorado Health Sciences Center**

Diplomate Of:

1973	**National Board of Medical Examiners**
1979	**American Board of Surgery**
1982	**Fellow, American College of Surgeons**

Licensure

Colorado Board of Medical Examiners, 1973 - 1991
California Board of Medical Quality Assurance, 1984 - Present
U.S. Bureau Narcotics/Dangerous Drugs, 1973 - Present

Professional Activities

1978-1984	National Affiliate Faculty, American Heart Association; Instructor/Trainer, Basic/Advanced Life Support
1978-1984	Medical Advisor, EMT Instructor, Glendale Fire Department, Glendale, Colorado
1979-1984	American College of Surgeons Committee on Trauma, Region 7
1981-1984	Governor's Advisory Council on Emergency Care, Colorado
1982-1984	Established and Directed Skin Bank, Univ. Colorado Med. Ctr.
1983	Examiner, American Board of Surgery
1984-	Provider/Instructor in Advanced Trauma Life Support
1984-1990	Editorial Board, Journal of Surgical Research
1985-	Director, Tissue Bank, Univ. California San Diego Med. Ctr.
1986-	Editorial Board, Journal of Burn Care & Rehabilitation
1991-1992	Scientific Advisory Board, U.C.S.D. Connect Program
1991-1992	Member, Tissue Engineering Consortium, U.C.S.D.
1992-	Infection Control Committee, U.C.S.D.
1992-	Provider/Instructor, Advanced Burn Life Support
1992-1996	FDA Advisory Panel, Plastic Surgery/Wound Healing Devices
1992-	Scientific Advisory Board, DepoTech Inc., La Jolla CA
1993-1996	Chairman, Research Committee, American Burn Association
1993-	Operating Room Committee, U.C.S.D.
1994-	Clinical Trials Committee, U.C.S.D.
1994-	National Faculty, Advanced Burn Life Support
1995-	Critical Care Committee, U.C.S.D.
1996-	Treasurer, American Burn Association

Memberships in Societies

1982	American Burn Association
1982	International Society for Burn Injuries
1983	Association for Academic Surgery
1985	American Association of Tissue Banks
1985	American Association for the Surgery of Trauma
1986	American Association for the Advancement of Science
1987	International Society of Surgery
1987	Surgical Infection Society
1989	Pan American Medical Association
1990	The Wound Healing Society
1990	Shock Society
1990	American College of Surgeons

Intermittent or Regular Reviewer For:

Journal of Burn Care and Rehabilitation
Journal of the American Medical Association
New England Journal of Medicine
Anesthesiology

Journal of Trauma
Shriner's Burn Institute Grants
National Institutes of Health
Journal of Surgical Research
Journal of Emergency Medicine
Journal of Applied Physiology
Journal of Intensive Care Medicine
Psychomatics

Visiting International Invited Professorships:

June 1990	Tokyo; Japanese Burn Association
October 1992	Capetown, South Africa: Plastic Surgery/Burn Congress
Fall 1994	Czech Republic (Prague, Brno, Hradkva)
February 1995	Osaka; Japanese Burn Association

Publications - Journal Articles, Published or In Press

1. Starzl TE, Putnam CW, Hansbrough JF et al: Biliary complications after liver transplantation. Surgery 81:212-21, 1977.
2. Hansbrough JF, Chandler JE: Lung lacerations following catheter insertion into the chest for pneumothorax. Emerg Med Serv 8:48, 1979.
3. Hansbrough J, Eiseman B: Immunosuppression by hyperbaric oxygen. Surgical Forum 30:313-5, 1979.
4. Kreutzer EW, Hansbrough JF: Superimposed traumatic and infectious proctitis: Two case reports. Sexually Transmitted Diseases 6:75-6, 1979.
5. Eiseman B, Weil R, Hansbrough J: New approaches for immunosuppression. Am Surg 46: 24-7, 1980.
6. Eiseman B, Sloan R, Hansbrough J, McIntosh R: Multiple organ failure: clinical and experimental. Am Surgeon 46:14-9, 1980.
7. Hansbrough JF, Piacentine JG, Eiseman B: Immunosuppression by hyperbaric oxygen. Surgery 87:662-7, 1980.
8. Hansbrough JF, Near A: Propranolol-epinephrine antagonism with hypertension and stroke. Ann Int Med 82:717, 1980.
9. Hansbrough JF, Clark JE, Reimer LG: Concentrations of kanamycin and amikacin in human gallbladder bile and wall. Antimicrob Agents Chemotherapy 20:515-7, 1981.
10. Lowenstein SR, Hansbrough JF et al: Cardiopulmonary resuscitation by medical and surgical house officers. Lancet ii:679-81, 1981.
11. Hansbrough JF, Clark JE: Concentrations of cefoxitin in gallbladder bile of patients undergoing cholecystectomy. Antimicrob Agents Chemotherapy 22:709-10, 1982.
12. Hansbrough JF, Narrod JA, Stiegman GV: Cardiac perforation and tamponade from a malpositioned subclavian dialysis catheter. Nephron 32:363-4, 1982.
13. Peterson V, Hansbrough JF, Buerk C, Wallner S, Rundus C, Robinson WA: Regulation of granulopoiesis following severe thermal injury. J Trauma 23:19-24, 1983.
14. Hansbrough JF, Peterson V, Kortz E, Piacentine J: Postburn immunosuppression in an animal model. Monocyte dysfunction induced by burned tissue. Surgery 93:415-27, 1983.
15. Hansbrough JF, Cain TL, Millikan JS: Placement of the 10 gauge catheter by cutdown for rapid fluid replacement. J Trauma 23:231-4, 1983.
16. Woelfel GF, Hansbrough JF: Spontaneous bacterial peritonitis and pneumoperitoneum. A false surgical emergency. J Am Med Assoc 249:921-2, 1983.
17. Hansbrough JF, Narrod JA, Rutherford RB: Arteriovenous fistulas following central venous catheterization. Intensive Care Med 9:287-9, 1983.
18. Millikan JS, Cain TL, Hansbrough JF: Rapid volume replacement for hypovolemic shock: a comparison of techniques and equipment. J Trauma 24:428-31, 1984.
19. Shannon FL, Jurkovich J, Hansbrough JF: Assessment of surgeons' proficiency in providing basic & advanced cardiac life suppport. Surg Gynec Obstet 159:9-12, 1984.
20. Hansbrough JF, Peterson V, Zapata-Sirvent RL, Claman H: Studies of post-burn immunosuppression in an animal model. II. Restoration of cell-mediated immunity by immunomodulating drugs. Surgery 95: 290-7, 1984.
21. Hansbrough JF, Zapata-Sirvent R, Carroll W, Wakimoto A, Dominic WJ: Clinical studies on the use of Biobrane, a synthetic bio-composite membrane, for coverage of burn wounds. Dialysis, Transplantation and Burns 2:37-41, 1984.
22. Yannas IV, Hansbrough JF, Ehrlich HP: What criteria should be used for designing artificial skin replacements and do current grafting materials meet the criteria? J Trauma 24:S31-5, 1984.
23. Hansbrough JF, Zapata-Sirvent R, Dominic W, Sullivan J, Boswick JF, Wang XW: Hydrocarbon contact injuries. J Trauma 25:250-2, 1985.
24. Hansbrough JF, Zapata-Sirvent R, Peterson V, Bender E, Claman H, Boswick JA: Characterization of the immunosuppressive effect of burned tissue in an animal model. J Surg Res 37:383-93, 1984.
25. Hansbrough JF, Zapata-Sirvent R, Carroll W, Dominic W, Wang XW, Wakimoto A: Clinical experience with Biobrane biosynthetic dressing in the treatment of partial thickness burns. Burns 10:415-9, 1984.
26. Hansbrough JF, Zapata-Sirvent RL, Carroll WJ, Johnson R, Saunders CE, Barton CA: The use of intravenous alcohol for prevention of withdrawal in alcoholic burned patients. Am J Surg 148:266-9, 1984.
27. Bender EM, Hansbrough JF, Zapata-Sirvent R, Claman HN: Restoration of immunity in burned mice by cimetidine. J Trauma 25:131-7, 1985.
28. Rundus C, Peterson V, Zapata-Sirvent R, Hansbrough J, Robinson W: Vitamin E improves cell-mediated immunity in the burned mouse: a preliminary study. Burns 11:11-5, 1984.
29. Bender EM, Hansbrough JF, Whitefield J, Anderson J, Claman HN: Prevention of postburn alterations in helper and suppressor T lymphocytes by cimetidine. Surg Forum 35:156-7,

1984.
30. Hansbrough JF, Bender EM, Zapata-Sirvent R, Anderson J: Altered helper & suppressor lymphocyte populations in surgical patients: a measure of postoperative immunosuppression. Am J Surg 148:303-7, 1984.
31. Reed BR, Zapata-Sirvent R, Hansbrough JF, Kinoshita JR: Contact dermatitis to Biobrane. J Plast Reconstr Surg 76:124-5, 1985.
32. Peterson V, Hansbrough J, Wang X, Zapata-Sirvent R, Boswick J: Topical cerium nitrate prevents postburn immunosuppression. J Trauma 25:1039-44, 1985.
33. Emmett M, Peterson VM, Winkler WS, Hansbrough JF, Crowle AJ: Crossed immunoelectrophoretic analysis of serum abnormalities following thermal injury. J Burn Care Rehab 5:448-56, 1985.
34. Robson M, Achauer B, Hansbrough J Heimbach D, Kucan J, MacMillan B, Stein J, Wachtel T: Synthetic burn wound dressings: Round Table Discussion. J Burn Care Rehab 6:66-73, 1985.
35. Hansbrough JF, Zapata-Sirvent R, Peterson V, Bender EM, Claman HN: Modulation of suppressor cell activity & improved resistance to infection in the burned mouse. J Burn Care Rehab 6:270-4, 1985.
36. Zapata-Sirvent R, Hansbrough J, Carroll W, Johnson R, Wakimoto A: Comparison of Biobrane and Scarlet Red dressings for treatment of donor site wounds. Arch Surgery 120:743-5, 1985.
37. Zapata-Sirvent R, Narrod J, Hansbrough J: Resoration of delayed hypersensitivity in mice receiving immunosuppressive drugs by cimetidine. Transplantation 39:449-50, 1985.
38. Hansbrough JF, Zapata-Sirvent RL, Bender E, Peterson V: Prevention of suppressed cell-mediated immunity in burned mice with histamine-2 receptor antagonist drugs. J Surg Res 39:150-6, 1985.
39. Mekori YA, Bender EM, Zapata-Sirvent R, Hansbrough JF, Claman HN: The effect of histamine receptor antagonists on specific and nonspecific suppression of experimental contact sensitivity. J Allergy Clinical Immunology 76:90-6, 1985.
40. Hansbrough JF, Zapata-Sirvent RL, Bartle EJ, Anderson JK, Elliott L, Mansour MA, Carter WH: Alterations in splenic lymphocyte subpopulations and increased mortality from sepsis following anesthesia in mice. Anesthesiology 63:267-73, 1985.
41. Zapata-Sirvent RL, Hansbrough JF: Postburn immunosuppression in an animal model. III. Maintenance of splenic helper and suppressor lymphocyte subpopulations by immunomodulating drugs. Surgery 97:721-7, 1985.
42. Peterson V, Robinson WA, Wallner SF, Rundus C, Hansbrough JF: Granulocyte stem cells are decreased in humans with fatal burns. J Trauma 25:413-8, 1985.
43. Hansbrough JF, Carroll WB, Zapata-Sirvent R, Boswick JA: Identification and antibiotic susceptibility of bacterial blood isolates from burned patients. Burns 11:393-403, 1985.
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45. Hansbrough JF: Roundtable discussion on the immune suppressed burn patient: Nutritional intervention. Bulletin and Clin Rev of Burn Injuries 2:23-4, 1985.
46. Hansbrough JF, Zapata-Sirvent RL, Shackford SR, Hoyt DB, Carter WH: Immunomodulating drugs increase resistance against sepsis in traumatized mice. J Trauma 26:625-30, 1986 (Presented, Am Assoc Surgery Trauma, Sept 1985, Boston MA).
47. Hansbrough JF, Zapata-Sirvent RL, Bender EM: Prevention of alterations in post-operative lymphocyte subpopulations by cimetidine and ibuprofen. Am J Surgery 151:249-55, 1986.
48. Zapata-Sirvent RL, Hansbrough JF, Bartle EJ: Prevention of posttraumatic alterations in lymphocyte subpopulations in mice by immunomodulating drugs. Arch Surg 121:116-22, 1986 (Presented, Surg Inf Soc, New Orleans, April 1985).
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50. Carroll W, Austgen W, Hansbrough J, Williams, S: The development of a program for juvenile fire offenders. J Burn Care Rehab 7:253-6, 1986.
51. Silva R, Cogbill T, Hansbrough J, Zapata-Sirvent R, Harrington DS: Intestinal perforation and vascular rupture in Ehlers-Danlos syndrome. Internat Surgery 71:48-50, 1986.
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53. Hansbrough JF, Miller L: Hypersensitivity to Biobrane: reaction to a chemical component. Plast Reconstr Surg 77:680, 1986.
54. Hansbrough JF: Burn wound sepsis. J Inten Care Med 2:313-27, 1987.
55. Hansbrough JF, Zapata-Sirvent RL, Peterson VM: Immunomodulation following burn injury. Surg Clin N America 67:69-92, 1987.
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stimulation in intrinsic/extrinsic imbalanced burned hands. J Burn Care Rehab 8:97-102, 1987.
57. Hansbrough JF, Field TO, Dominic WJ, Gadd MA, Crum RL: Burns Critical Decisions. Prob in Crit Care 1:588-610, 1987.
58. Field TO, Dominic WJ, Hansbrough JF: An inherited enzyme deficiency resulting in hyperammonemia and coma in a burn patient. Burns 13:229-31, 1987.
59. Field TO, Dominic W, Hansbrough JF: Beach-fire burns in San Diego County. Burns 13:416-8, 1987.
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61. Hansbrough JF, Field TO, Gadd MA, Soderberg C: Immune response modulation after burn injury: T-cells and antibodies. J Burn Care Rehab 8:509-12, 1987.
62. Hansbrough JF, Miller LM, Field TO, Gadd MA: High dose intravenous immunoglobulin therapy in burn patients: pharmacokinetics and effects on microbial opsonization and phagocytosis. Ped Infectious Dis J 7:S49-56, 1988.
63. Miller LM, Carroll WB, Hansbrough JF: The effect of antimicrobial prophylaxis for burn wound excision: ceforanide versus cefazolin. Curr Ther Research 41:946-51, 1987.
64. Dominic W, Field TO, Hansbrough JF: Sulfuric acid burns in a child: histologic examination as an indicator of wound depth. J Burn Care Rehab 8:395-7, 1987.
65. Crum R, Bobrow B, Shackford S, Hansbrough JF, Brown MR: The neurohumoral response to burn injury in patients resuscitated with hypertonic saline. Presented, Am Assoc Surg Trauma, Montreal, Sept 1987; J Trauma 28:1181-7, 1988.
66. Rockwell E, Dimsdale JE, Carroll WB, Hansbrough JF: Preexisting psychiatric disorders in burn patients. J Burn Care Rehab 9:83-6, 1988.
67. Hansbrough JF, Soderberg C, Field TO, Swisher S, Brahme J, Zapata-Sirvent RL, Tonks M, Gadd MA: Analysis of murine lymphocyte subpopulations by dual-color flow cytometry. Technical considerations against specificities of monoclonal antibodies directed against surface markers. J Surg Res 44:121-36, 1988.
68. Dominic W, Hansbrough JF, Field, TO Jr, Carroll WB: Warfarin-induced skin necrosis: an entity occasionally requiring burn wound expertise. Burns 14:139-41, 1988.
69. Gadd MA, Hansbrough JF, Soderberg CS, Field TO: Antibody formation after murine injury. J Surg Res 44:649-57, 1988.
70. Ozkan AN, Pinney E, Hoyt DB, Ninnemann J, Hansbrough JF: Elastase and suppressor active peptide activity following burn injury. J Trauma 28:207-10, 1988.
71. Boyce SR, Hansbrough JF: Biological attachment, growth, and differentiation of cultured human epidermal keratinocytes on a graftable collagen and chondroitin-6-sulfate substrate. Surgery 103:421-31, 1988.
72. Dominic W, Field T, Hansbrough J: Comparison of wick and fiberoptic catheters in measurement of interstitial pressures in burned extremities. Burns 14:125-9, 1988.
73. Boyce ST, Christianson DJ, Hansbrough JF: Structure of a collagen-GAG skin substitute optimized for cultured human epidermal keratinocytes. J Biomed Mat Res 22:939-57, 1988.
74. Hansbrough JF, Hoyt DB, Gadd MA, Ozkan N: The Immunologic Response in the Injured Patient - Practical Implications. In: Problems in General Surgery: Multidisciplinary Approaches to General Surgical Problems, Ed AR Moossa; JB Lippincott Co, In Press.
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76. Davis JW, Hansbrough JF: Use of overhead hooks in burn surgery. J Burn Care Rehab 9:492, 1988.
77. Hoyt DB, Shackford SR, Hollingsworth-Fridland P, Mackersie RC, Hansbrough JF, Wachtel TL, Fortune JB: Video recording trauma resuscitations: an effective teaching technique. J Trauma 28:435-40, 1988.
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80. Gadd MA, Hansbrough JF: The effect of thermal injury on murine neutrophil oxidative metabolism. J Burn Care Rehab 10:125-30, 1989.
81. Miller LM, Mooney CJ, Hansbrough JF: Comparative evaluation of cefaclor versus cefadroxil in the treatment of skin and skin structure infections. Curr Ther Res 46:405-10, 1989.
82. Stompro BE, Hansbrough JF, Boyce ST: Attachment of peptide growth factors into implantable collagen. J Surg Res 46:413-21, 1989.

83. Gadd MA, McClellan DS, Neuman TS, Hansbrough JF: Effect of hyperbaric oxygen on murine neutrophil and T lymphocyte functions. Crit Care Med 18:974-9, 1990.
84. Hoyt DB, Shackford SR, McGill T, Mackersie RM, Davis J, Hansbrough JF: The impact of in-house surgeons and operating room resuscitation on outcome of traumatic injuries. Arch Surgery 124:906-10, 1989.
85. Hansbrough JF: Massive doses of midazolam infusion for delirium tremens. Crit Care Med 17:597, 1989.
86. Gunn ML, Hansbrough JF, Davis JW, Furst SR, Field TO Jr: Prospective randomized trial of hypertonic sodium lactate versus lactated Ringer's solution for burn shock resuscitation. J Trauma 29:1261-7, 1989.
87. Cooper ML, Hansbrough JF, Boyce ST, Foreman TJ: Rapid formation of anchoring fibrils and basement membrane after placement of dermal-epidermal composite skin substitute on full-thickness burn wounds. Surgical Forum 40:584-6, 1989.
88. Hansbrough JF, Boyce ST, Cooper ML, Foreman TJ: Burn wound closure with cultured autologous keratinocytes and fibroblasts attached to a collagen-glycosaminoglycan substrate. J Am Med Assoc 262:2125-30, 1989.
89. Hansbrough JF, Gadd MA: Temporal analysis of murine lymphocyte subpopulations by monoclonal antibodies and dual-color flow cytometry following injury. Surgery 106:69-80, 1989.
90. Greenberg RN, Hansbrough JF, Lorber RR, Miller GH: Netilmicin sulfate as single-agent therapy for pseudomonas infections. Southern Med J 82:715-8, 1989.
91. Miller LM, Hansbrough JF, Slater H, Goldfarb IW, Kealey P, Saffle J, Kravitz M, Silverstein P: Sildimac: A new delivery system for silver sulfadiazine in the treatment of full-thickness burn injuries. J Burn Care Rehab 11:35-41, 1990.
92. Hansbrough JF, Zapata-Sirvent RL, Hoyt D: Postburn immune suppression: An inflammmatory response to the burn wound? Presented, Am Assoc for Surgery of Trauma, Chicago, Oct 1989. J Trauma 30:671-5, 1990.
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94. Hoyt DB, Ozkan AN, Hansbrough JF, Marshall L, van Berkum-Clark M: Head injury: An immunologic deficit in T-cell activation. Presented, Am Assoc for Surgery of Trauma, Chicago, Oct 1989; J Trauma 30:759-67, 1990.
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99. Hansbrough JF: Current status of skin replacements for coverage of extensive burn wounds. J Trauma 30:S155-62, 1990.
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105. Cooper ML, Laxer JA, Hansbrough JF: The cytotoxic effects of commonly used topical antimicrobial agents on human fibroblasts and keratinocytes. J Trauma 31:775-84, 1991.
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